



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/065,143

09/20/2002

Xiaoguo Tang

201-1341

2762

32242

7590

02/23/2004

DYKEMA GOSSETT PLLC  
2723 SOUTH STATE STREET  
SUITE 400  
ANN ARBOR, MI 48104

EXAMINER

TRAN, BINH Q

ART UNIT

PAPER NUMBER

3748

DATE MAILED: 02/23/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Applicati n No.

10/065,143

Applicant(s)

TANG ET AL.

Examiner

BINH Q. TRAN

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-15 is/are allowed.
- 6) ☒ Claim(s) 16-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This office action is in response to the amendment filed November 26, 2003.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

***Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collier, Jr. (Collier) (Patent Number 6,405,720 B1) in view of design choice.***

Regarding claims 16-18, Collier discloses all the claimed limitation as discussed above except the compression ratio of the engine is within the range of approximately 10:1-15:1, and an equivalence ratio of about 0.15 to 0.65.

Regarding the specific range of the compression ratio of the engine, it is the examiner's position that a range of approximately 10:1-15:1 of the compression ratio, and an equivalence ratio of about 0.15 to 0.65 of the engine would have been an obvious matter of design choice well within the level of ordinary skill in the art, depending on variables such as the size of the engine, as well as mass flow rate of the exhaust gas, the engine operation conditions, and the controlled temperature of the catalytic converter. Moreover, there is nothing in the record which establishes that the claimed parameters present a novel or unexpected result (See *In re Kuhle*, 562 F. 2d 553, 188 USPQ 7 (CCPA 1975)).

Art Unit: 3748

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. In re Dreyfus, 22 CCPA (Patents) 830, 73 F.2d 931, 24 USPQ 52; In re Waite et al., 35 CCPA (Patents) 1117, 168 F.2d 104, 77 USPQ 586. Such ranges are termed "critical" ranges, and the applicant has the burden of proving such criticality. In re Swenson et al., 30 CCPA (Patents) 809, 132 F.2d 1020, 56 USPQ 372; In re Scherl, 33 CCPA (Patents) 1193, 156 F.2d 72, 70 USPQ 204. However, even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. In re Sola, 22 CCPA (Patents) 1313, 77 F.2d 627, 25 USPQ 433; In re Normann et al., 32 CCPA (Patents) 1248, 150 F.2d 627, 66 USPQ 308; In re Irmischer, 32 CCPA (Patents) 1259, 150 F.2d 705, 66 USPQ 314. More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al. v. Coe, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

***Allowable Subject Matter***

Claims 1-15 are allowed.

Since allowable subject matter has been indicated, applicant is encouraged to submit formal drawings in response to this Office action. The early submission of formal drawings will permit the

Art Unit: 3748

Office to review the drawings for acceptability and to resolve any informalities remaining therein before the application is passed to issue. This will avoid possible delays in the issue process.

***Response to Arguments***

Applicant's arguments filed November 26, 2003 have been fully considered but they are not completely persuasive. ***Claims 1-18 are pending.***

*Applicant's arguments, see Page 6, lines 19-27; Page 7, lines 1-28; and Page 8, lines 1-12, filed November 26, 2003, with respect to Claim 1 has been fully considered and are persuasive. Accordingly, the Office Action mailed on September 09, 2003 (Paper No. 5) has been withdrawn.*

Applicant's cooperation in explaining the claims subject matter more specific to overcome the claim rejection is also appreciated.

Applicants have argued that Collier, Jr. does not teach or suggest Applicants's claimed invention. More specifically, Applicants assert that the reference to Collier fails to disclose "*the engine is intended to run solely and exclusively on hydrogen and is accordingly called a "Hydrogen Fueled Spark Ignition Engine"*", and, additionally, Collier fails to teach "*a catalytic converter as a lean NOx trap*".

In response to applicant's arguments, the recitation of "*the engine is intended to run solely and exclusively on hydrogen and is accordingly called a "Hydrogen Fueled Spark Ignition Engine"*" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on

Art Unit: 3748

the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Moreover, Applicants assert that the reference to Collier fails to teach “*a catalytic converter as a lean NOx trap*”. The examiner respectfully disagrees, the patent to Collier discloses “*a method of producing near zero NOx and near zero CO emissions in exhaust gas of from an internal combustion engine using gaseous fuel comprised of natural gas and at least one additional gas selected from hydrogen and carbon monoxide*”. In column 6, lines 17-56, Collier has disclosed that “For purposes of operating the internal combustion engine under conditions that produce near zero carbon monoxide in the exhaust discharged, the engine is operated at air and gaseous fuel equivalence ratios,  $\Phi$ , in the range of 0.99 to 0.7, with preferred ratios being in the range of 0.95 to 0.8. For purposes of operating the internal combustion engine under conditions that produce near-zero NOx in the exhaust discharge, the engine is operated at air plus recirculated exhaust to gaseous fuel equivalence ratios,  $\Phi$ , in the range of 0.6 to 0.45, with the preferred ratios being in the range of 0.58 to 0.52. By near-zero NOx is meant that less than 10 ppm NOx is present in the exhaust gas emitted from the internal combustion engine. By near-zero CO is meant that less than 10 ppm carbon monoxide is present in the exhaust gas discharged to the atmosphere. In accordance with the present invention, 30 to 50 vol. % of the exhaust gas emitted from internal combustion engine 2 is recirculated and added to the gaseous fuel/air mixture for purposes of dilution of the mixture for purposes of providing near-zero NOx in the exhaust gases. As noted, the second portion of the exhaust gas to be discharged to the atmosphere is first forwarded along line 12 for treatment in catalytic reactor 14. Reactor 14 oxidizes the carbon monoxide in the exhaust to carbon dioxide

Art Unit: 3748

by use of the excess oxygen resulting from the lean burn. Accordingly, carbon monoxide is converted to carbon dioxide before the second portion of the exhaust gas is discharged to the atmosphere. Catalytic reactor 14 can be comprised of a bed of particles or extruded parallel channels. *The base material for the particles and the channels can be any suitable refractory such as alumina or cordierite. The catalyst is coated on the base material and can comprise platinum, palladium, rhodium or a mixture thereof*. Typically, the amount of carbon monoxide entering reactor 14 is less than 1000 ppm and typically the amount leaving the reactor is less than 5 ppm. Further, the operating temperature of the reactor is typically greater than 300 °C “. It is well understood in the art that “*The base material for the particles and the channels can be any suitable refractory such as alumina or cordierite. The catalyst is coated on the base material and can comprise platinum, palladium, rhodium or a mixture thereof*” is also trap NO<sub>x</sub> in the exhaust gas of the internal combustion engine.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Binh Tran whose telephone number is (703) 305-0245. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reach on (703) 308-2623. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.



BT  
February 20, 2004

Binh Tran  
Patent Examiner  
Art Unit 3748